OBITUARIES

Kyozi Kawasaki

Kyozi Kawasaki, one of the major contributors to statistical physics over the past half century, passed away on 12 November 2021 in Fukuoka, Japan.

Born on 4 August 1930 in Shiga prefecture, Japan, Kyozi was a teenager during World War II. The hardships he incurred during and after the war greatly influenced his choice of career as an adult. Kyozi received both his BS and MS in physics from Kyushu University, followed by a PhD in physics in 1959 from Duke University, where he was greatly inspired by Michael Buckingham and William Fairbank.

After graduation, Kyozi held several academic positions in the US (at MIT and Temple University) and in Japan (at Nagoya, Kyushu, and Kyoto Universities). As a young researcher, he worked at MIT with Irwin Oppenheim, and at Kyoto University he collaborated with Hazime Mori. In 1976 Kyozi accepted a professorship at Kyushu University, and he remained there until his retirement in 1994. But he continued to be active in science and taught physics at Chubu University and the Fukuoka Institute of Technology.

Kyozi worked on a broad range of statistical-physics systems, primarily exploring their dynamics. His papers contain seminal results that led to new predictions and influenced a great number of theoreticians and experimentalists alike. In 1966 Kyozi presented a key model of spin-exchange dynamics in which the order parameter is conserved. Now known as the Kawasaki spin dynamics, it was used later in a vast number of simulations and theoretical studies of ordering dynamics.

In the late 1960s, Kyozi constructed a general mode-coupling theory (MCT) of systems undergoing a phase transition close to a critical point. More specifically, he showed that critical dynamics in near-critical fluids is governed by hydrodynamic interactions. His prediction of the decay rate of critical fluctuations agreed remarkably well with experiments on light scattering and sound attenuation in fluids. His MCT was later applied to magnetic systems and superfluids. In the mid 1970s, Kyozi expanded his tour-de-force MCT to general spatial dimensionalities and clarified the relationship between his theory and the dynamic renormalization group theory. In the late 1970s, Kyozi started to study phase ordering associated with phase transitions. In particular, Kyozi laid the foundation for future work through his predictions of how hydrodynamic interactions modify spinodal decomposition and fluids under shear flow.

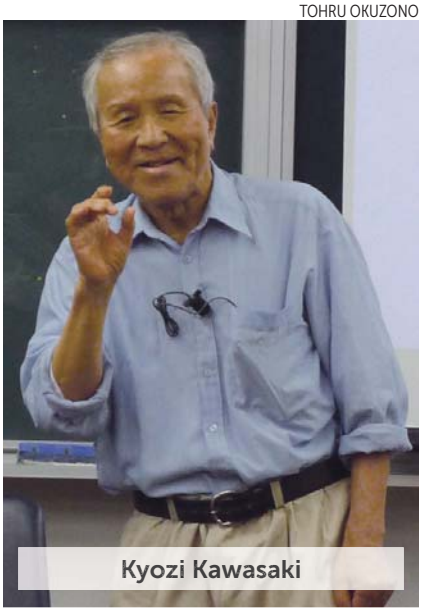
It is worth emphasizing that Kyozi was interested in transport properties as a fundamental problem in statistical physics. Together with Oppenheim, he carried out in 1965 a density expansion of transport coefficients in a dilute gas that resulted in logarithmic correction terms. His MCT made it possible to evaluate the anomalous part of the transport coefficients. In 1973 Kyozi and James Gunton proposed a theory for nonlinear transport coefficients.

Throughout his career, Kyozi emphasized the pathway from equilibrium to nonequilibrium statistical physics, and he stressed the importance of nonlinear, nonequilibrium statistical physics. His other contributions include theories for random-interface growth, defect and vortex dynamics, multicomponent membranes and vesicles, liquid crystalline elastomers, and mesoscopic phases of polymeric systems. His more recent work dealt with a mode-coupling approach to the glass transition and its precursors.

Kyozi always paid special attention to educating and stimulating his younger peers. As a consequence, he was successful in choosing excellent research associates and graduate students, many of whom hold academic positions throughout Japan.

Kyozi was a corecipient of the 2001 Boltzmann Medal, the highest distinction in statistical physics, which is given once every three years by the International Union of Pure and Applied Physics. His contributions to science were also recognized by the 1972 Nishina Memorial Prize, a 1992 Humboldt Research Award, and a 2000 Toray Science and Technology Prize, among other distinctions.

TOHRU OKUZONO



Kyozi Kawasaki

Kyozi Kawasaki will be remembered not only for his great scientific achievements but also for his support, gentle demeanor, and love of science, which made him an exemplary role model for generations of younger scientists, in Japan and worldwide. The physics community has lost one of its greatest and most creative members. His legacy, though, will continue to influence statistical physics for many years to come.

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Kyozi Kawasaki

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